



## ***FAA TRAINING PROGRAMS IN AVIATION MEDICINE***

### ***Aeromedical Education Division Civil Aeromedical Institute FAA Office of Aviation Medicine***

The Aeromedical Education Division of the Civil Aeromedical Institute (CAMI) offers several aeromedical training programs for Aviation Medical Examiners (AMEs), civil aviation pilots, and others in the civil aviation community. These training programs include: Basic Aviation Medical Examiner Seminars, Theme Aviation Medical Examiner Seminars, Multimedia Aviation Medical Examiner Refresher Course (MAMERC), Clinical Aerospace Physiology Review for Aviation Medical Examiners Course (CAPAME), Aviation Physiology Course, Global Survival Course, and the FAA International Exchange Visitor Program.

#### **AVIATION MEDICAL EXAMINER TRAINING PROGRAMS**

The Federal Aviation Administration has a voluntary force of approximately 5,300 physicians designated to perform duties as Aviation Medical Examiners (AMEs). These AMEs are located in the private sector, Federal agencies (Air Force, Navy, Army, NASA, Coast Guard, others) and in 93 countries around the world. AMEs are given authority to perform physical examinations of U.S. airmen to determine their qualifications for the issuance of a medical certificate as required under Part 67 of the Code of Federal Regulations. In addition to providing an essential service to the aviation population, AMEs have the responsibility to ensure that only those applicants who are physically and mentally fit to perform flying duties safely will be

issued medical certification. To properly discharge the duties associated with this responsibility, AMEs must have detailed knowledge and understanding of the FAA rules, regulations, policies, and procedures related to the medical standards and the certification process.

#### ***Basic Aviation Medical Examiner Seminar***

This one-week seminar is offered 3-4 times per year at the FAA Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma. Completion of this seminar is one of the mandatory requirements for designation as an AME for the FAA. This seminar is designed to: Familiarize new AMEs with the FAA medical certification program and their responsibilities in this program. Recognize the basis for disqualification of an airman with a medical problem and the conditions necessitating deferral or denial as outlined in Federal Aviation Regulations. Understand and be able to explain to an airman the denial process to include steps necessary for certification appeal rights. Enable AMEs to become the local authority in aviation medicine, and as a resource to assist medical colleagues in determining who may be able to fly safely as a patient or airman. This seminar complies with ICAO International Standards on Personnel Licensing, Annex 1 to the Convention on International Aviation, No. 1.2.4.4. "Contracting states shall designate medical examiners, qualified and licensed in the practice of medicine, to conduct medical examinations

of fitness of applicants for the issue or renewal of the licenses or ratings...”, and No. 1.2.4.4.1 “Medical examiners shall have had, or shall receive, training in aviation medicine...”

### ***Medical Certification Standards and Procedures Training (MCSPT)***

Completion of this training is one of the mandatory requirements for designation as an AME for the FAA. AME applicants must complete this training as a pre-requisite for attendance to a Basic AME Seminar. A staff member from the AME’s office is also required to complete this training prior to the AME’s designation and subsequently every 3 years. MCSPT is a computer-based course (also available in correspondence version) that was designed to familiarize AMEs and their staffs with the administrative aspects of the medical certification program, and to prevent/reduce AME errors in the processing of medical certification documentation that are time-consuming and costly to the FAA.

### ***Theme Aviation Medical Examiner Seminars***

To maintain their designation, AMEs are required to complete refresher training every 3 years. One alternative to comply with this training requirement is to attend a 2 ½ day theme AME seminar. The seminars are offered in 6 different locations across the U.S. every year. The first day of the seminar is completely devoted to a particular medical theme. Available themes are: 1) Cardiology, 2) Neurology, Neuropsychology, and Psychiatry, 3) Ophthalmology, ENT, and Endocrinology and 4) Aviation Physiology and Human Factors. These seminars are designed to provide the latest medical and technical information and clinical techniques in various medical fields and specialties, to improve the proficiency of AMEs in their medical practice. Improve the AME’s knowledge, techniques and skills in medically evaluating airmen. This is accomplished by instructing AMEs in those medical specialties and behavioral sciences that will enable them to assess the airman’s ability to operate an aircraft with maximum mental and physical proficiency.

### ***Multimedia Aviation Medical Examiner Refresher Course (MAMERC)***

Another option to comply with the mandatory AME refresher training requirement is to complete MAMERC. This course can be used as a substitute for Theme AME Seminar attendance on alternate 3-year cycles, which extends the time between seminar attendance to 6 years and reduces AME travel expenses and time away from the office. The MAMERC is a computer-based training course (also available in correspondence version) designed to evaluate and enhance the quality of airman medical certification decisions made by AMEs. The MAMERC evaluates, instructs, and tests AMEs on their knowledge of medical certification standards and how they apply such knowledge to make appropriate aeromedical certification decisions. For the first time in the history of the FAA AME program a training course was designed to evaluate, instruct, and test AMEs on their medical decision-making skills regarding airmen fitness to fly. AMEs not only have to demonstrate their knowledge of medical certification standards, but how they apply such knowledge to make appropriate aeromedical certification decisions. The course includes a videotape containing 30 scenarios that portray AMEs, Aeromedical Certification Division personnel, Regional Flight Surgeons, and consulting physicians performing their various duties in the airman medical certification process. After viewing each scenario, AMEs are required to complete a pre-test that evaluates their knowledge of medical certification standards and their aeromedical decision-making skills. Those AMEs who successfully complete the pre-test may reduce total training time to three or four hours. AMEs who are not as proficient are provided with a more detailed, self-paced, interactive instruction designed for maximum learning efficiency. Furthermore, the MAMERC provides an effective quality assurance and quality improvement tool for the Aeromedical Certification Program.

***Clinical Aerospace Physiology Review for  
Aviation Medical Examiners Course  
(CAPAME)***

This computer-based course (also available in correspondence version) was designed to enable AMEs to recognize the hazards of pilot exposure to self-imposed and environmental stress factors during the operation of an aircraft, that may lead to impairment, incapacitation, or death. This course familiarizes AMEs with the physiological effects resulting from the interaction between humans, the aerospace physical environment, and the aircraft. The objective of this course is to enable AMEs to recognize unsafe conditions and/or practices during the operation of an aircraft that may lead to the physiological impairment and/or incapacitation of pilots. AMEs can increase their knowledge of aerospace physiology and improve their ability to assist airmen who experience aviation-related medical problems. In addition, AMEs must possess the necessary knowledge in aerospace physiology to provide appropriate advice to civil aviation pilots regarding the impact of these aviation-related stress factors. The course includes a videotape with 30 scenarios portraying airmen who have been affected by a variety of problems including hypoxia, hyperventilation, decompression sickness, trapped gases, acceleration exposure, noise exposure, vibration exposure, laser exposure, spatial disorientation, airsickness, carbon monoxide poisoning, heat stress, self-imposed stress, etc. After viewing each scenario, AMEs are required to complete a pre-test that evaluates their knowledge of medical certification standards and their aeromedical decision-making skills.

***Advanced Aerospace Medicine Multimedia  
Course (AAMMC)***

Aerospace medicine is a very dynamic scientific discipline that must keep pace with not only the rapid advances in medicine in general, but also unique aerospace medical issues resulting from the accelerated introduction of new aerospace technologies. Maintaining currency in civil aerospace medicine presents a challenge for all physicians who are involved in the day-to-day operational aeromedical support of civil aviation. FAA physicians as well as AMEs are the target populations for this new multimedia course that is currently under development. However, this course will be made available to anybody who is interested.

**AIRMEN TRAINING PROGRAMS**

Airmen training programs are designed to promote aeromedical knowledge and safety among the approximately 600,000 civil aviation pilots in the U.S.

***Aviation Physiology Course***

Physiological training for pilots was introduced in the military in 1942 to prevent and/or reduce the number of incidents, accidents, and fatalities resulting from pilot exposure to the hostile environmental conditions encountered during flight.

Pilots who are knowledgeable about aeromedical facts are certainly better prepared to deal with unexpected and/or expected inflight events such as: 1) loss of cabin pressure (slow or rapid) leading to hypoxia, trapped gas problems, or decompression sickness, 2) exposure to an unfamiliar motion environment leading to spatial disorientation, 3) exposure to acceleration forces (Gs) leading to gray-out, black-out, or even unconsciousness (G-LOC), 4) exposure to noise, vibration, or thermal stress leading to impaired performance, and 5) exposure to self-imposed stresses which may lead to, and/or aggravate, any of the above mentioned inflight events.

The U.S. Code of Federal Regulations (CFR), Title 14, Part 61.31 (f)(2)(i), indicates that no person may act as pilot in command of a pressurized airplane that has a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL unless that person has completed ground training that includes instruction on respiration; effects, symptoms, and causes of hypoxia and any other high altitude sicknesses; duration of consciousness without supplemental oxygen; effects of prolonged usage of supplemental oxygen; causes and effects of gas expansion and gas bubble formations; preventive measures for eliminating gas expansion, gas bubble formations, and high altitude sicknesses; physical phenomena and incidents of decompression; and any other physiological aspects of high altitude flight.

The objective of the FAA Aviation Physiology Course is to familiarize pilots with the physiological and psychological stresses of flight including the effects of self-imposed stress (illegal and legal drug use, alcohol consumption, smoking, fatigue,



inadequate nutrition, sedentary lifestyle, excessive caffeine consumption, etc.) and their impact on aviation safety.

This course includes practical demonstrations of rapid decompression (8 to 18K feet), hypoxia (25K feet), and night vision, using the safest and most technologically advanced training altitude chamber (Fig. 1) available in the U.S. today



Figure 1. Altitude Chamber

CAMI has the only operational altitude chambers (training and research) in the U.S. that meet the current safety standards in the pressure vessel industry to ensure the protection of occupants, operators, and maintenance staff. This requires that the design, fabrication, testing, and inspections of the chamber meet the following standards: 1) American Society of Mechanical Engineers, (ASME) ASME/ANSI, PVHO-1 “Safety Standards for Pressure Vessels for Human Occupancy”, 2) ASME, “Boiler and Pressure Vessel Code”. Section VIII, Division I, “Rules for Construction of Pressure Vessels”, Section II, “Material Specifications”, and Section IX, “Welding and Brazing Qualifications”, 3) National Fire Protection Association, (NFPA), 70, National Electrical Code, (NEC) National Fire Protection Association, (NFPA), 99B, Hypobaric Facilities.

The Aviation Physiology Course also includes a practical demonstration of spatial disorientation using a General Aviation Spatial Disorientation Demonstrator (GYRO) or the Virtual Reality Spatial Disorientation Demonstrator (VRSDD). The critical importance of this type of practical demonstration is evidenced by aircraft accident investigation reports indicating that inflight spatial disorientation is a causal or contributing factor in about 10% of all general aviation accidents. Furthermore, it has been reported that up to 90% of the total number of general aviation accidents involving inflight spatial disorientation are fatal.

The GYRO (Fig. 2) is a device that provides 360 degree continuous yaw motion as well as + or - 15 degree pitch and 30 degree roll which, in conjunction with a computerized imaging system, results in a realistic simulation of flight. The GYRO provides civil aviation pilots, aviation medical examiners, and FAA flight crews with the opportunity to experience vestibular and visual illusions (spatial disorientation) that occur during IFR conditions in an inherently safe environment. The programmed flight in the GYRO does not require an instructor - only an external safety observer. The pilot receives a 2-min orientation and then takes the controls. The 6-min. flight progresses from VFR, with “out-the-window” scenes on a CRT, to IFR conditions.



Figure 2. GYRO



Figure 3. VRSDD

The VRSDD (Fig. 3) is a one-of-a-kind prototype that uses a powerful computer with terrain and aircraft database and a Head Mounted Display (HMD). This visual system is coupled with a 360 degree continuous yaw motion-platform and allows for a very realistic demonstration of the effects of spatial disorientation during flight. The key difference between the VRSDD and other spatial disorientation devices is that it immerses the pilot in a real time 3-dimensional space. The VRSDD utilizes high resolution 3-dimensional imagery to create a flight environment which is “virtually” real. The user has a real time interaction with the virtual environment by becoming part of it and by being able to manipulate/control it. Virtual reality is an effective, efficient, and inherently safe technology that can be used to simulate logistically impractical, expensive, or even dangerous real world settings (i.e., aviation and space environments, medical procedures, etc.).

The VRSDD is being used by civil aviation pilots, aviation medical examiners, and FAA flight crews participating in Aviation Physiology training courses offered at CAMI. It is also being used in support of the National Accident Prevention Program throughout the U.S. It provides civil aviation pilots with the opportunity to experience, in an inherently safe environment, certain vestibular illusions that occur during IFR conditions. The VRSDD provides a practical and highly convincing demonstration of the human limitations to maintain spatial orientation during IFR conditions, as well as emphasizing the importance of relying on cockpit instrumentation to

safely fly under these conditions. This device provides the practical means to convince VFR rated pilots to stay out of IFR conditions, and increases awareness among IFR rated pilots that they are not impervious to the effects of spatial disorientation simply because they hold an IFR rating.

### ***Global Survival Course***

The Global Survival Course provides the necessary knowledge and skills for coping with various common survival scenarios including desert, arctic, and water environments following an emergency aircraft landing, ditching, or a crash. Practice sessions are conducted using a thermal chamber, a ditching tank, and an emergency evacuation aircraft simulator. In addition, this course teaches how to easily assemble and use a personal survival kit.

The thermal chamber (Fig. 5) is used to practice survival techniques and procedures in a cold (-20°F), windy (15-20 mph), and dark (simulated night) environment.



Figure 4. Fire Starting Demonstration



Figure 5. Thermal Chamber



The ditching tank (Fig. 6) is used to practice techniques and procedures for emergency egress from a Cessna Sabreliner or a Beechcraft King Air; as well as water survival techniques, the use of flotation devices, and rescue procedures (using a helicopter hoist). The water temperature in the ditching tank is maintained around 80 °F.



Figure 6. Ditching Tank

The emergency evacuation simulator (Fig. 7) consists of a section of fuselage of a passenger aircraft that is elevated (using hydraulic jacks) and then filled with non-toxic smoke (glycerin) to provide a practical and very realistic simulation of an emergency evacuation scenario due to smoke in the cabin.



Figure 7. Emergency Evacuation Simulator

### ***Aviation Physiology Video Course***

The objective of this course is to familiarize civil aviation pilots with the physiological effects of exposure to flight stress factors and self-imposed stress, as well as the appropriate preventive and/or protective measures. This distance education course can be made available to every civil aviation pilot who requests a copy, and to anybody else interested in the promotion of aviation safety. Topics covered in this video course include: physics of the atmosphere, respiration and circulation, hypoxia, hyperventilation, trapped gases, decompression sickness, oxygen equipment, cabin pressurization, motion sickness, fitness for flight, spatial disorientation, self imposed stress, thermal stress, fatigue, vision in aviation, noise and vibration, acceleration exposure. The first part of this video course is nearing completion.

### ***Global Survival Video Course***

The objective of this course is to familiarize civil aviation pilots with the basic survival methods and techniques to increase their chances of survival following an emergency aircraft landing, ditching, or a crash. Topics covered in this video course include: will to survive, cold land survival, hot land survival, water survival, jungle survival, survival medicine, survival signaling, survival kits. This video course is under development.

### ***Human Factors in General Aviation Operations Video Course***

This video course has been funded and will be developed in the near future.

### **OTHER AEROMEDICAL EDUCATION SERVICES**

#### ***International Outreach Program***

CAMI supports foreign requests for assistance in civil aviation medicine and aviation human factors. The support provided includes: participating in the design, development, implementation and/or evaluation of international training activities in aviation medicine; presenting formal lectures; facilitating discussions; and providing technical advice and information. These international activities help promote aviation safety by discussing FAA medical

standards, policies, and procedures with professionals in foreign countries who are involved in the organization and development of their own civil aviation programs.

### ***FAA International Exchange Visitor Program***

The FAA Civil Aeromedical Institute supports international programs that promote interaction between aviation medicine professionals, enable exchange of scientific information, and promote FAA's leading role in civil aviation medicine worldwide.

One such program is the International Exchange Visitor Program, which allows qualified specialists from foreign civil aviation organizations to enter the U.S. to conduct studies and/or exchange information and expertise at FAA facilities and at a minimum cost to the agency. The main objective of this program is to promote global aviation safety through international cooperation activities, promotion of FAA policies and procedures and of U.S. standards and equipment, and avoidance of unnecessary duplication of research efforts.

Participants in this program: 1) learn the functions and responsibilities of the FAA Office of Aviation Medicine as they relate to the promotion of aviation safety, 2) participate in the day-to-day work activities at CAMI, 3) share their specialized knowledge and skills with FAA's specialists in support of various operational programs, and 4) receive the benefits of interacting with FAA professional and technical personnel at a leading civil aviation medicine institute

### ***Aeromedical Publications***

High quality publications are produced to fulfill the diverse aeromedical information needs of FAA personnel, AMEs, civil aviation pilots, pilot schools, and others in the civil aviation community interested in the promotion of safety.

The *Federal Air Surgeon's Medical Bulletin* is a quarterly publication that features the following sections: 1) The Federal Air Surgeon's Column - Updates on Office of Aviation Medicine's programs, goals, objectives, policies, and procedures as articulated by the Federal Air Surgeon, 2) Aeromedical Certification Cases - Discussion of special

aeromedical certification cases involving pilots or air traffic controllers, 3) Aviation Medicine Research Update - Description of aeromedical and human resources research accomplishments of relevance to aviation safety, 4) Incapacitated Pilot Tales - Discussion of actual pilot incapacitation's, the outcomes, and the lessons learned. Description of civil aviation incidents and accidents where pilot incapacitation/impaired performance played a significant role in the occurrence of such events, 5) Aviation Medical Examiner Program News - AME education programs updates. Profiles of AMEs and their accomplishments in support of the civil aviation community. Letters and articles from AMEs (opinions, suggestions, experiences, etc.). Updates on the administrative aspects of the AME program, 6) Aviation Physiology Update - Discussion of aerospace physiology and human factors issues that have an impact on civil aviation operations, 7) Office of Aviation Medicine News - Relevant news items from the perspective of AAM personnel from headquarters, regions, centers, and the Civil Aeromedical Institute, and 8) Meetings Calendar - Information about upcoming national and international scientific events (conferences, meetings, symposia, courses, etc.) in the field of aviation medicine and its allied disciplines.

Medical Facts for Pilots are short brochures designed to provide essential information to civil aviation pilots regarding potential aeromedical hazards, and how to prevent or cope with them to ensure flight safety. Currently available titles include: Alcohol and Flying, Altitude Decompression Sickness, Disorientation, Hearing and Noise in Aviation, Hypoxia, Laser Eye Surgery, Over The Counter Medications and Flying, Pilot Vision, Seat Belts and Shoulder Harnesses: Smart Protection in Small Airplanes, Smoke.

FAA Office of Aviation Medicine Technical Reports are publications used to disseminate the results of aeromedical and aviation human factors

research conducted by the FAA Office of Aviation Medicine. To date 811 technical reports have been published on a wide range of subjects from Angular Acceleration to Workload Effects on Complex Performance.

### ***Aeromedical Library Services***

CAMI has one of the best libraries in the world specialized in aviation medicine and human factors. Library services to CAMI and Office of Aviation Medicine patrons include 1) interlibrary loans through membership in two automated networks that provide access to the collections of approximately 29,000 participating libraries; 2) literature searches using numerous online databases and CD-ROM products; 3) reference services; 4) table-of-contents service from 200+ hardcopy journals and electronic sources; and 5) acquisition and cataloging of books, journals, and other types of information materials. The special collection, which focuses on aviation medicine and aviation human factors, is networked with several other libraries so that the unique materials may be shared. These materials include 5,800 books, 200+ current journal titles, 12,000 cataloged technical reports, a basic reference collection, multimedia CBI programs, and numerous CD-ROM titles.

For additional information about any of the above mentioned training programs and services please contact:

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